DEPARTMENT OF TRANSPORTATION
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Dear All:

Thank you for your continued engagement in the Taylor Run Stream Restoration project. This letter is in response to your January 11, 2021 letter requesting the City to consider tree planting to achieve Chesapeake Bay pollution reduction credits as an alternative to the Taylor Run Stream Restoration and includes responses to several other inquiries about the project approach.

We appreciate your continued acknowledgement of staff's engagement on this technical project. With that in mind, we are using this letter to provide a deeper discussion on the project and its benefits. Finally, and of note, staff is in the process of scheduling additional engagement opportunities this spring at which we will address additional project details.

EXECUTIVE SUMMARY: The Taylor Run Stream Restoration project will restore the stream corridor, protect an exposed sanitary sewer pipe from damage, enhance local water quality and the stream's riparian buffer, and address state and federal Chesapeake Bay Total Maximum

Daily Load (TMDL) cleanup mandates. City staff has performed extensive public engagement and modified the design, incorporating feedback where applicable, consistent with our commitment to collaborative planning.

Despite claims to the contrary, this project will not impact either an adjacent acidic seepage wetland or a mature stand of trees near the footbridge outside the wetland. Also, despite claims to the contrary, the project design and pollutant removal calculations are consistent with approved state and federal guidance and follow best practices currently being applied by numerous jurisdictions. We expect similar practices to be applied to over 441 miles of urban streams in in the Chesapeake Bay Watershed as identified in Watershed Implementation Plans submitted by the six states and the District of Columbia to the Environmental Protection Agency. Note that since the inception of Virginia's Stormwater Local Assistance Fund (SLAF) grant program in FY 2014 (with no funding appropriated in FY18 and FY20 delayed due to COVID), a total of 111 stream restoration projects have been awarded matching grants for a total SLAF funding of $61 million for stream restoration projects using similar means and methods.

Conversely, soils data submitted from a local resident (and to which you refer) was analyzed using a method that understates the amount of total phosphorus to be reduced by the stream restoration project. It is staff's understanding the samples were analyzed by the lab you referenced using the Mehlich-3 method. This method is typically used to determine phosphorus in soil that is bioavailable to plants and does not capture total phosphorus, which is one of the pollutants of concern for the Bay TMDL. Staff contacted the Brookside Laboratories (referenced in your letter as the lab performing the analysis) and confirmed that the Mehlich-3 test performed by the lab on the soil samples does not measure total phosphorus. *For these reasons, staff concludes the soils were not analyzed in a manner that could be used to calculate pollution reduction credits or to determine the financial cost-benefit for this project.*

Staff has tracked the progress of the *Recommendations of the Expert Panel to Define BMP Effectiveness for Urban Tree Canopy* that was finalized in September 2016 and applied this approach to generate best management practice (BMP) credits. The very small amount of reductions calculated by this approach is not practicable to meet large-scale reductions in a highly urbanized area. However, in response to your request, the City offers the following direct comparison as to whether tree planting could be a viable substitute to generate an equivalent amount of pollutant reductions as the Taylor Run Stream Restoration project: To achieve an equivalent pollution reduction, the City would need to plant between 421,000 and 686,000 trees at a low-end estimated cost of $84 million to $137 million. The Taylor Run Stream Restoration project is estimated to cost $4.5 million, including a $2.25 million grant from the state. While the City strongly supports expansion of its tree canopy, *tree planting through the recently approved Urban Tree Canopy Expansion BMP is not a viable substitute for this project.*

In conclusion, while staff acknowledge the ongoing discussion in the scientific community, our evidence supports that this will be a valuable environmental initiative that will improve conditions in this important stream and forested park.

BACKGROUND: The Taylor Run Stream Restoration project will restore the stream corridor, protect an exposed sanitary sewer pipe from damage, enhance local water quality and the stream's riparian buffer, and address state and federal Chesapeake Bay TMDL cleanup mandates. The project helps clean up the Chesapeake Bay as required in the City's Municipal Separate Storm Sewer System (MS4) permit special conditions to address the Chesapeake Bay TMDL for nutrients (total nitrogen and total phosphorus) and sediment (total suspended solids). The upper limit of the project is the outfall located near the Chinquapin Recreation Center and extends downstream for approximately 1,900 linear feet. Based on photographic and anecdotal evidence, the stream corridor has endured several major disturbances, including piping of the upstream portion, straightening and channelization, downcutting, and accelerated erosion. Taylor Run was identified in 2008 (Phase II Stream Assessment) as a candidate for restoration, predating development of the Bay TMDL in 2010 and promulgation of special conditions to address the Bay TMDL in the City's 2013 MS4 permit. Cancelling this project in pursuit of alternatives for water quality compliance would not address the ongoing stream bank erosion and continued incision of the channel, protect existing trees that are at risk of loss, stabilize the exposed sanitary sewer pipe, or maintain a healthy and stable riparian buffer.

DISCUSSION: The City's project team includes staff from the Department of Transportation and Environmental Services (T&ES), Department of Recreation, Parks and Cultural Activities (RPCA), the Department of Project Implementation (DPI), and qualified consultants. The team has held public engagement meetings, onsite meetings, "small expert group" meetings, and opened a public comment period where many comments were received. Comments and responses can be found on the project website. Your letter includes comments related to:

1. Concerns about the "acidic seepage wetland" and nearby large trees
2. Pollution reduction credit calculations
3. Alternatives to addressing pollution reduction goals such as tree planting

Staff also notes that it is important to understand that stabilization of the existing sanitary sewer infrastructure, located in an existing easement, is a complementary part of the stream restoration project. Ongoing failure to complete the stabilization add to the risk of raw sewage being released to the stream. Additional details are provided below:

1. Acidic Seepage Wetland and Nearby Large Trees

Summary: The project will not impact the acidic seepage wetland. Also, in response to input received at public meetings, the project design has been adjusted to move the limits of disturbance farther away from the wetland and preserve a stand of mature trees. No wetlands will be impacted or altered by this project, either during construction or after.

At the onset of the design process, the pedestrian trail was identified as the ideal project access given that it is relatively clear of vegetation and that the existing sanitary sewer easement roughly follows the trail. Since the footprint of the existing pedestrian trail was to be used as access (and would be within the project limits) a bypass trail would need to be determined. A request was made early in the conceptual design process to explore locating the pedestrian trail bypass near the stream but outside of the project limits. The location of the existing pedestrian

trail is very near but not within the acidic seepage wetland, so that the construction access at that time was near the wetland. Designing the pedestrian trail bypass for this location near the stream as suggested would require the trail bypass to encroach on the wetland. This idea was quickly abandoned, requiring the pedestrian trail bypass to be located uphill through the Chinquapin Park playground and Recreation Center areas. Therefore, the next plan iteration showed no encroachment into the delineated wetland area from the trail bypass and the project limits remained outside of the delineated wetland.

As you stated, the City's project team incorporated input following a November 7, 2020 onsite discussion to redesign the construction access at this location even farther away from the wetland, and also to save a nearby stand of mature trees identified by your group. The topography at this location made it difficult to redesign this portion of the restoration, as it was also the preferred location to cross the stream to access the sanitary sewer easement on the north side of the stream to complete stabilization work for the sewer being temporarily protected by the previously installed sheet pile. However, the project team was able to redesign the access and move the stream crossing to the north (upstream) and redesign the restoration work in this area in response to your request to save this stand of mature trees. Staff shared the updated design with the "small expert group" on January 15 and during a January 28 public engagement meeting. The previous plan set and the plan sheets that were redesigned were made available on the project website.

In regards to continued concerns about "flooding the wetland" it is important to note that before downcutting of the stream occurred over time and in response to significant storm events, it is likely that nearby wetlands would have been connected to the stream in high flow conditions. A representative from the consultant's team discussed this at several meetings: That, based on the design and the modeling, the wetlands may receive limited floodplain flows from the stream during larger storm events and modeling shows overbank velocities are non-erosive. The representative also stated that during these larger storms it is likely the wetland feature would receive overland flow exceeding the capacity of the small drainage feature crossed by the pedestrian bridge near the wetland. This small drainage feature receives flow from inlets uphill in the park that flow into a storm sewer pipe that then discharges into this small drainage feature, and ultimately flows into the stream as shown in the plan sheets. Additionally, during these larger storm events, the wetland would likely receive flows in the form of overland flow from adjacent uphill areas. Therefore, this wetland is already receiving overland flow from other sources in large storm events and there should be no adverse effect on the wetlands from this project. In fact, ongoing research suggests that the design at Taylor Run is more likely to enhance/restore lost wetland functions and may result in the development of an expanded wetland footprint.

2. *Pollution Reduction Credit Calculations*

Summary: The project design and pollution credit calculations follow the state's guidance and protocols developed by a reputable panel of scientific experts and which are currently being applied by jurisdictions performing urban streams restoration in six states and the District of Columbia in the Chesapeake Bay Watershed. Notably, soil sampling and analysis to which you have referred used a laboratory analysis method that reports concentrations for bioavailable

phosphorus that is only one constituent part of total phosphorous (TP), which is the pollutant of concern for the Bay. Therefore, this soil analysis cannot be relied upon to calculate pollutant removal for TP, nor can it be relied upon to determine the cost-benefit for the project for pollutant removal.

This stream restoration project design and calculated pollution reduction credits are in accordance with Virginia Department of Environmental Quality (DEQ) action plan guidance to use the protocols in the *Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects* (Stream Expert Panel Report). This report includes protocols that are vetted and accepted best practices that are being used by numerous jurisdictions in the Bay to perform stream restoration projects in the Bay. The City's project uses Protocol 1 ("Credit for Prevented Sediment During Storm Flow") since the design focuses on preventing further channel and bank erosion. Protocol 1 includes the use of the BANCS method to predict annual streambank erosion rates and provides nutrient concentration default value derived from representative stream reaches to calculate sediment load reduction credits. The City used these steps when calculating a pollution reduction of 295 lbs./yr. of TP to be achieved by the Taylor Run Stream Restoration project. The protocols in the report (which include using 11 reference streams in Pennsylvania[1]) are intended to provide a defensible, consistent, statistically-reliable, and conservative baseline for jurisdictions to use when calculating phosphorous reduction for stream restoration projects in the Bay. Any suggestion that the City of Alexandria alone should come up with its own methodology ignores these important points.

It has also been brought to staff's attention that a resident conducted soil sampling and phosphorous analysis. City staff's knowledge of the soil sampling is based on information presented in your letter and anecdotally elsewhere. It is staff's understanding the samples were lab analyzed using the Mehlich-3 method. *This method is typically used to determine phosphorus in soil that is bioavailable to plants and does not capture total phosphorus concentrations, which is one of the pollutants of concern for the Bay TMDL.*[2,3] Staff contacted the Brookside Laboratories referenced in your letter and confirmed that the Mehlich-3 test performed by the lab does not measure total phosphorus. For these reasons, staff concludes the soils were not analyzed in a manner that could be used to calculate pollution reduction credits or to determine the financial cost-benefit for this project.

3. Alternatives to Stream Restoration (Tree Planting and Stormwater Management BMPs) Summary: The tree planting approach suggested is not a viable substitute for this stream restoration. In order to achieve an equivalent pollution reduction, the City would need to plant

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[1] ESTIMATING VOLUME, NUTRIENT CONTENT, AND RATES OF STREAM BANK EROSION OF LEGACY SEDIMENT IN THE PIEDMONT AND VALLEY AND RIDGE PHYSIOGRAPHIC PROVINCES, SOUTHEASTERN AND CENTRAL PA. Walter et. Al., 2007

[2] *Understanding Soil Tests for Plant-Available Phosphorus.* Maurice Watson (Emeritus Associate Professor) and Robert Mullen (Assistant Professor). The Ohio State University Extension. June 2007 - 3373

[3] Article: *Differences of Phosphorus in Mehlich 3 Extracts Determined by Colorimetric and Spectroscopic Methods.* J. J. Pittman, H. Zhang, J. L. Schroder & M. E. Payton. Communications in Soil Science and Plant Analysis, Volume 36, 2005 - Issue 11-12. Published Online: 05 Feb 2007

between 421,430 and 686,000 trees. Using your figure of $200/per tree, the costs would run between $84 million and $137 million. The City Department of Recreation, Parks and Cultural Activities uses a cost of $300/tree when making similar estimates. Alternative stormwater management BMPs would range between $88,000 and $225,000 per pound for a cost that would run between $26 million and $66 million.

The City strongly supports the planting of trees through policy initiatives, City planting efforts, the site plan development process, stormwater utility credits for plantings on private property, and by incorporating tree planting into City projects such as the recent retrofits of Ben Brenman Pond and Lake Cook, and as proposed at Taylor Run. Staff has tracked the progress of the *Recommendations of the Expert Panel to Define BMP Effectiveness for Urban Tree Canopy* that was finalized in September 2016 and sought to apply the approach to generate BMP credits. (Note that while this BMP has been accepted for use towards addressing the Bay TMDL, Virginia has not yet accepted this BMP to meet state requirements for site plan development projects.) The very small amount of reductions calculated by this approach is not practicable to meet large-scale reductions in a highly urbanized area. However, in response to your request the City offers the following direct comparison as to whether tree planting could be a viable substitute to generate an equivalent amount of pollutant reductions as the Taylor Run Stream Restoration projects. There are multiple goals for a stream restoration project, just as there are multiple benefits to increasing the urban tree canopy. However, any discussion of substituting tree planting for stream restoration requires focus on reducing pollutants of concern using approved BMPs for the Bay.

The Taylor Run project total is estimated at $4.5 million, with a matching grant of $2.25 million funded through the FY 2019 DEQ Stormwater Local Assistance Fund (SLAF) program. To meet a comparable reduction of 295 lbs./yr. of TP to be achieved by the Taylor Run Stream Restoration project would require the planting of about 421,430 new trees as canopy over existing impervious surface (see Attachment: Tree Planting Calculations). If planting new trees as canopy over existing turfgrass, the calculation yields the need for over 686,000 new trees. Using your figure of $200 per tree, the cost for tree planting alone would be between $84.3 million and $137.2 million, respectively, depending on planting over turfgrass or impervious area. At $300 per tree (per RPCA estimate), the tree planting cost alone would be between $126.5 million and $205.8 million. Feasibility of space and the cost of this effort is likely why, as stated in your letter, "no other urban locality in the Chesapeake Bay watershed has undertaken meaningful tree planting to achieve its Bay pollution reduction goals." It is also important to note that due to the high cost per pound of phosphorous removal, these BMPs would not meet the eligibility requirements of $50,000/lb. or less to be considered for a SLAF grant.

Notwithstanding the above exercise, the City continues to strongly support urban tree planting expansion of the urban tree canopy. As a complementary strategy to planned projects, the City is exploring ways to implement this BMP for Bay pollution reduction given that it is included in DEQ's recent Chesapeake Bay TMDL Special Condition Guidance (GM No. 20-2003) as a strategy.

Staff feels that it is also important to note that while the City's Chesapeake Bay TMDL Action Plan identifies stream restoration as a cost-effective strategy to address Bay mandates and identifies specific stormwater management BMPs to achieve pollution reduction targets, it also incorporates the planning-level consideration of bioretention and other potential BMPs in the right-of-way and other public spaces. One of those locations was the right-of-way of King Street and public properties in the approximate 333 acres that drain to this segment of Taylor Run. Currently, about 30% of this drainage area is served by BMPs. Cost-benefit estimates to implement additional BMPs range from $88,000 to $225,000 per lb. of TP reduced, assuming one BMP could be designed to capture once acre; with the low end representing underground BMPs and the higher end representing green infrastructure. (These estimates do not consider feasibility or constructability; nor utility conflicts, property acquisition, long-term maintenance or other unforeseen costs that may arise during the planning, scoping, and design phases.) Notwithstanding those unforeseen costs and feasibility, smaller scale practices as alternatives are estimated at $26 million to $66 million to implement between 300 to 400 new BMPs. It is also important to note that due to the high cost per pound of phosphorous removal means that not even one of these BMPs would meet the eligibility requirements of $50,000/lb. or less to be considered for a SLAF grant.

Sanitary Sewer Infrastructure Stabilization
It is important to note that stabilization of the existing sanitary sewer infrastructure, located within an existing easement, is a complementary part of this project. The sanitary sewer is in an easement that runs streamside along the pedestrian trail. There are two sewer crossings and the sewer line is exposed above the current, incised stream bottom. There are two manholes exposed within the stream bank, and a previous 'quick fix' of a manhole can be observed downstream where the 'sheet pile' was installed to protect the manhole and the pipe joints into the manhole in anticipation of a more permanent and natural fix taking place in the future.

Stabilization must take place to decrease the risk of damage to the exposed sanitary sewer infrastructure and the release of raw sewage to the stream. Stabilization not associated with the stream restoration would still require access, and therefore the removal of trees and use of heavy equipment and would not restore the degraded stream. Stabilization as complementary practice employed during the stream restoration ensures that natural techniques will be used to stabilize the infrastructure, which includes 'burying' the sewer crossings that have been exposed due to the stream downcutting, and restoring the banks around manholes that have been exposed due to stream widening; thereby blending the infrastructure with the stream corridor and greatly reducing the risk for the release of raw sewage. In addition to the sanitary sewer infrastructure stabilization, the degraded stream will be restored, native species will be planted to create a dense riparian buffer, local water quality will be enhanced, and the City will address the Bay mandates.

CONCLUSION: The Taylor Run Stream Restoration project will restore the stream corridor, protect an exposed sanitary sewer pipe from damage, enhance local water quality and the stream's riparian buffer, and address state and federal Chesapeake Bay TMDL cleanup mandates. This project will not impact either an adjacent acidic seepage wetland or a mature stand of trees. In contrast with the soil analysis to which you refer, the project design and

pollutant removal calculations are consistent with approved state and federal guidance, and follow best practices currently being applied by numerous jurisdictions in six states and the District of Columbia. Staff understands similar practices will be applied to over 441 miles of urban streams in the Chesapeake Bay Watershed. The project replanting plan will provide needed stewardship to this important park and urban forest, and will result in 2,280 new, native trees and over 7,000 new, native shrubs to create a dense riparian buffer. Based on the City's analysis, tree planting is not a viable substitute for this project.

Finally, as you may be aware, the City has applied for grant funding through the Virginia Department of Transportation (VDOT) Smart Scale program to make improvements on Upper King Street near Bradlee Shopping Center, a portion of which is *upstream* in the Taylor Run watershed. VDOT staff is recommending the project receive nearly $40 million, which includes significant drainage improvements for stormwater quality and quantity. Both the City and VDOT welcome additional input on this grant at future VDOT sessions (more information is available at smartscale.org). Staff believes the grant will contribute to future water quality improvements in Taylor Run and, in the future, further enhance the benefits of this necessary stream restoration. Together, these projects will be important contributions to the City's Eco-City Alexandria initiative, and we hope you will join us in advocating for these grants in order to achieve city goals.

Thank you again for your engagement and interest in the project. I hope the responses and information shared is helpful. Please feel free to contact me or Jesse Maines at jesse.maines@alexandriava.gov or 703.746-4643 if you have additional questions.

Sincerely,

Yon Lambert, Director
Transportation and Environmental Services

Attachment: Tree Planting Calculations

Cc: The Honorable Mayor and Members of City Council
Mark B. Jinks, City Manager
Emily A. Baker, Deputy City Manger
James Spengler, Director, Recreation Parks and Cultural Activities
Terry Suehr, Director, Project Implementation
Gina Baum, Chair, Alexandria Parks and Recreation Commission
Kathie Hoekstra, Chair, Alexandria Environmental Policy Commission
Matthew J. Stricker, Secretary of Natural Resources, Virginia
David K. Paylor, Director, Virginia Department of Environmental Quality

Attachment: Tree Planting Calculations

City of Alexandria Consideration of Tree Planting Requirements as an Equivalency to the Taylor Run Stream Restoration Project

March 5, 2021

At your request, the City investigated the implications of substituting tree planting in lieu of the Taylor Run Stream Restoration project. There are multiple goals in doing the stream restoration project, just as there are multiple benefits to increasing the urban tree canopy. However, the discussion of substituting tree planting for stream restoration requires a focus on reducing pollutants of concern using approved BMPs for the Bay found in the *Recommendations of the Expert Panel to Define BMP Effectiveness for Urban Tree Canopy* (Tree Expert Panel Report, September 12, 2016).

Urban Tree Canopy Expansion BMP, credits are based on a modeling approach and not on site-specific data. The model scenarios account for a variety of tree species, mortality, and growing conditions. Each new tree planted is eligible for a creditable area of 144 square feet that translates to 300 trees per acre with the average nutrient and sediment reductions; however, there is no associated planting density requirement. The BMP provides two crediting values for TP depending on whether the new tree is 1) planted over existing turfgrass or 2) planted over existing impervious area. The following formulas calculates the lbs./yr. of TP reduced by one tree to determine the equivalent number of trees needed to equal the same lbs./yr. for the stream restoration project.

1) One (1) Tree over turfgrass = 144 sf/43560 sf/ac * 23.8% * 0.55 lbs./ac/yr. = 0.00043 lbs./yr.
2) One (1) Tree over impervious = 144 sf/43560 sf/ac * 11.0% * 1.93 lbs./ac/yr. = 0.00070 lbs./yr.

Where square feet are converted to acres, multiplied by the BMP efficiency, and multiplied by the loading rate to determine the lbs./yr. TP removed per tree planted.

The Taylor Run project total is estimated at $4.5M, with a matching grant of $2.255M through the FY 2019 DEQ SLAF program. To meet a comparable reduction of 295 lbs./yr. of TP to be achieved by the Taylor Run Stream Restoration project would require the planting of about 421,430 new trees over existing impervious if one tree reduces 0.00070 lbs./yr. of TP (295 lbs./yr. ÷ 0.00070 lbs./yr. = equivalent number trees). If planting over existing turfgrass, the calculation yields the need for over 686,000 new trees if one tree reduces 0.00043 lbs./yr. TP (295 lbs./yr. ÷ 0.00043 lbs./yr. = equivalent number of trees). While the BMP allows for dispersed plantings, for illustrative purposes, if the trees were able to be planted at a density of 300 trees per acre, you would need to plant trees over 1,405 acres of impervious area or 2,287 acres of turfgrass for this BMP to reduce a comparable amount of phosphorus. At $300 per tree (per RPCA estimate), if planting is feasible, the cost would be between $126.5M - $205.8M, respectively, if all trees planted over turfgrass or if all trees were planted over impervious area. Using your figure of $200 per tree, the cost would be between $84.3M - $137.2M, respectively,

depending on planting over turfgrass or impervious area. A similar cost-benefit would apply to other stream restoration projects based on calculated pollutant reductions. Feasibility of space and the overwhelming cost of this effort is likely why, as you state in your letter, "no other urban locality in the Chesapeake Bay watershed has undertaken a meaningful tree planting to achieve its Bay pollution reduction goals." Therefore, the Urban Tree Canopy Expansion BMP is not a substitute for the Taylor Run Stream Restoration project or other stream restoration projects given the cost and issues with feasibility.

Finally, the calculation estimating that 2.7 acres of forest would be removed is significantly overstated as it implies the area is currently 'forested' in a natural state, and in pristine condition. The removal of about 260 trees along the stream includes 23% of which are dead and a large portion that are located within the sanitary sewer easement (where trees should not be growing as they pose a threat to the structural integrity and functioning of the sanitary sewer, thereby increasing the risk of causing a release of raw sewage into the stream). The project replanting plan includes planting 2,280 native trees and over 7,000 native shrubs to create a dense riparian buffer. The restoration will stabilize the banks to mitigate accelerated erosion and tree loss; and replant the riparian buffer to a greater density that currently exists.